

Math 574 Exam 2 1987

There are 10 problems (each worth 10 points) on 6 pages.
Explain your work. Circle your answer when possible. Write
 your answer as a number when possible.

- ① List the first 6 rows of Pascal's triangle. (Go as far as 1 5...)
- ② A care package is a bag containing 12 cans of soup. If four flavors of soup are available, how many types of care packages can be created?
- ③ If a fair coin is flipped 6 times, what is the probability of getting an even number of heads and a head on the first toss?
- ④ What is the coefficient of xy^2z^2w in the expansion of $(x+y+z+2w)^6$?
- ⑤ A code is being written using the letters a, b, c, d. How many 6 digit codewords are there which use each letter at least once?
- ⑥ How many pure monomials of degree d can be formed using the variables x_1, x_2, \dots, x_n ? (The expression $x_1^{e_1} x_2^{e_2} \dots x_n^{e_n}$ is a pure monomial of degree d if each e_i is a non-negative integer and $e_1 + \dots + e_n = d$. For example, the pure monomials of degree 3 using the variables x_1 and x_2 are $x_1^3, x_1^2 x_2, x_1 x_2^2, x_2^3$.)

⑦ Prove that $\sum_{k=0}^n k^3 = \frac{n^2(n+1)^2}{4}$.